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ABSTRACT

A system for the analysis of elementary school science teacher's guides and other program materials is described. The system, which can be used with either textbook-based or activity-based programs, produces a detailed step-by-step account of "What the classroom would be like if the teacher followed the recommendations in the teacher's guide literally." Each unit of activity is called a student task: student tasks are characterized with respect to a number of features, including suggested classroom organization, teacher and student activities, conceptual information content, and science process skills addressed. (Author/CS)

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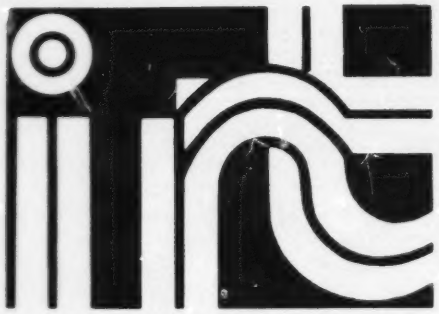

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Research Series No. 89

THE TASK FEATURES ANALYSIS SYSTEM

Nancy Landes, Edward L. Smith,
and Charles Anderson

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Abstract

This user's manual describes a system for the analysis of elementary school science Teacher's Guides and other program materials. The system, which can be used with either textbook-based or activity-based programs, produces a detailed step-by-step account of "what the classroom would be like if the teacher followed the recommendations in the Teacher's Guide literally." Each unit of activity is called a student task; student tasks are characterized with respect to a number of features, including suggested classroom organization, teacher and student activities, conceptual information content, and science process skills addressed. The system can be used in conjunction with the Instructional System for Observing and Analyzing Elementary School Science Teaching (Research Series No. 90) or it can be used independently.

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THE TASK FEATURES ANALYSIS SYSTEM

Nancy Landes, Edward L. Smith, and Charles Anderson[1]

Introduction

This handbook is designed to facilitate the literal analysis of science curriculum materials. The procedures presented are appropriate for use with most prepared science program materials whether they are from a textbook-based or an activity-based science program.

The purpose of such an analysis is two-fold: (1) to state the author's intentions for science instruction, and (2) to place the curriculum tasks in a form that facilitates comparison with actual classroom instruction. In other words, a literal program analysis presents what an author actually says should be accomplished in particular lessons in a form that can be compared to a teacher's actual presentation of these lessons in the classroom. From a literal program analysis, a classroom researcher may more easily identify a teacher's modifications of, additions to, and deletions from the written curriculum.

In most curriculum programs, a teacher receives sequentially organized materials. The instructional material usually consists of large instructional units, sections, or parts divided into individual lessons or chapters. Each lesson or chapter contains descriptions of

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individual instructional tasks. These tasks specify what students are to accomplish at any given point in the sequence of instruction. Thus, the student task will serve as the smallest unit for the literal program analysis.

The handbook acquaints the classroom researcher with procedures for completing a literal program analysis using the student task as the basis for the analysis. First, we will present an overview of task analysis procedures. Next, we will explain and demonstrate the specific task analysis features and coding system through a complete task analysis. Because the delineation of particular tasks is not always a straightforward procedure, specific ground rules for task identification will complete the handbook. To facilitate the literal program analysis, once the reader has completed the handbook explanation, all necessary charts and codes are presented compactly in Appendix A.

Initial Procedures

The following procedures begin a literal program analysis:

1. Know the organization and general characteristics of the curriculum programs.

2. Identity the particular parts of the curriculum for analysis.

3. Make a copy of the materials for analysis.

4. Read the instructional material to identify specific student tasks to be accomplished. Mark the start and the end of each task with a pencil mark, as shown in this example from the Science Curriculum Improvement Study (SCIS) Ecosystems Teacher's Guide, Chapter 12, p. 66. (See Figure 1.)

   In this chapter, the students are to accomplish eight tasks, as follows:

   Paragraph 1. Task 1. Watch the demonstration to note the bubbles of gas.
   Task 2. Suggest that BTB may be used as a test for carbon dioxide.

The children obtain a sample of the gas that is given off as a seltzer tablet is dissolved in water. They bubble this gas through a BTB solution and use the interaction they observe to identify the gas. This discovery activity reinforces the children's understanding of the use of BTB as an indicator for carbon dioxide. The activity may be carried out on the same day as Chapter 10. It will take one class period to complete.

Task 1

TEACHING MATERIALS

For each team of two children:

- 1 vial (Drawer 1)
- 1 vial cap with hole (Drawer 1)
- 1 plastic tube (Drawer 8)
- 1 plastic cup (Drawer 3)

For the class:

- 6 bottles of BTB (Drawer 6)
- 1 package of seltzer tablets (Drawer 8)
- containers to be filled with water

Task 2

Task 3

Task 4

Task 5

Task 6

Task 7

Task 8

TEACHING SUGGESTIONS

Demonstrating the gas generator. To introduce this activity, set up a gas generator as follows:

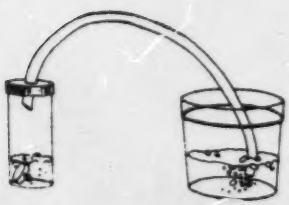
1. Fill a plastic cup about half full of water and a vial one-quarter full of water.
2. Insert a plastic tube into the hole in the vial cap to a depth of about ¼ inch.
3. Drop one seltzer tablet into the vial of water and snap the cap on the vial. (The open end of the tube should not touch the water.)

Ask your students what is happening to the tablet. They should be aware that the tablet is bubbling as it dissolves. Now place the other end of the plastic tube into the cup of water. When the children see gas bubbling through the water in the cup, ask them how they might test whether this gas contains carbon dioxide. They will probably suggest using BTB.

Children's experiments. Have the children pick up the materials they will need and begin the experiment. One member of each team should add twelve drops of BTB to the water in the cup while the other sets up the rest of the equipment. In very little time, the children will observe that gas from the tablets interacts with BTB.

Discussion. After the children have observed the results of their experiment, ask them questions similar to these: What kind of gas do the tablets produce? What evidence did you use to identify the gas? Also ask the children to compare the results of blowing through blue BTB with those from this experiment.

Cleanup. The BTB solutions may be discarded. All equipment should be rinsed and allowed to dry. Be certain that all seltzer residue in the gas generators is removed. If any of this material remains, it could affect the results of future experiments with organisms.



A gas generator

OPTIONAL ACTIVITY

Comparing gases. How much carbon dioxide is there in exhaled breath, seltzer gas, and air? Your students might trap samples of room air and exhaled breath in plastic bags, quickly secure the openings of the bags around tubes, and close the bags with twistems. The gas from the seltzer tablet may be collected by dropping one tablet in a vial of water, snapping on the cap, and inserting the free end of the tube into the opening of a plastic bag. The bag should be inflated until the gas in it equals the amount in the other samples. The children may then bubble these gases through equal amounts of BTB solutions by squeezing the plastic bags and compare the results.

Figure 1. Example from the Science Curriculum Improvement Study (SCIS) Ecosystem Teacher's Guide marked with the start and finish of student tasks.

Paragraph 2. Task 3. Pick up materials.
Task 4. Set up experiments.
Task 5. Observe the gas bubbles in their own experiments.
Paragraph 3. Task 6. Discuss the results of their experiments.
Task 7. Compare the experiments to blowing through BTB.
Paragraph 4. Task 8. Clean up the equipment.

5. Re-read the text carefully to be sure that all tasks have been identified. Specific ground rules for task identification are presented in a later section in this handbook.

6. Save the marked copies for documentation of the task identification portion of the literal program analysis.

Overview of the Task Analysis Features

Once the tasks are identified, each task needs to be analyzed systematically for certain features, including format, student materials, proposed teacher activity, proposed student activity, information content, science tasks, and function/linkage. A chart (Figure 2) is used to analyze each task individually. It specifies the features to be analyzed for any given task. For each task feature, the chart is divided into three sections: (1) the name of the task analysis feature, (2) the code, and (3) comments.

Code Column

The column marked "code" is used for all features except function and linkage. A number, corresponding to a given code, is placed in this column for each task feature except function and linkage. A plus or minus sign is placed before the coded number to indicate an explicit or implicit reference. A plus is used before the number if the information is stated directly in the text, a minus is used before the number if the information must be inferred from the text. (The level of inference will be explained later.) The actual codes are listed in the section entitled Coding Specific Task Analysis Features.

Program _____ Date _____ Analyst _____ Chapter/Part _____

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			
FORMAT			
STUDENT MATERIALS	A	B	
PROPOSED TEACHER ACTIVITY			
PROPOSED STUDENT ACTIVITY			
INFORMATION CONTENT	Source A / Source B	Code #	
SCIENCE TASKS			
FUNCTION AND LINKAGE			

Program Text

Figure 2. Chart used to analyze individual tasks.

Comments Section

The comments section justifies the use of a particular code or describes in detail the feature of interest. A dotted line (see Figure 2) divides the comments section into two parts. The left side of the dotted line is used for comments based directly on the portion of text reproduced under "program text." The right side is used for comments based on other parts of the teacher's guide or other program materials.

Analyzing Tasks

In analyzing each task from the literal program text, the researcher may find that not all of the features are directly evident from the program text. If no reference is made to a specific task feature, then the researcher is to code NS for "not specified." A researcher has three options for coding or describing a particular feature.

1. Task feature is *stated directly* in the text; no inference is necessary. This feature will be coded and/or described. The code will be preceded by a plus sign as described earlier.

2. Task feature is *inferred directly* from the text; low-level inference is necessary. This feature will be coded and/or described; in this case, the researcher must justify any code used. The code will be preceded by a minus sign as described before.

3. Task feature is *not specified* in the program text; high level of inference is necessary. This feature would be coded NS (not specified) and would not be described.

For example, in the third task of *SCIS Ecosystems*, Chapter 12, presented earlier, the student materials are stated directly in the text (although off to the side of the page). In this instance, student materials would be coded with a plus sign before the code number because the materials needed are stated directly in the text.

In task two of the same chapter, the format is not directly stated anywhere in the program text. However, the format, teacher-academic presentation to the whole class, may be inferred directly from the text from statements such as: "Ask them...," "They will probably suggest...." Thus, the format feature would be coded with a minus sign before the code number because it may be inferred from information in the text.

In the fourth and fifth tasks specified earlier, the format is stated fairly directly; however, no mention is made of the teacher's activity during these tasks. Even though one might assume that the teacher is to monitor the students' progress, the teacher could just as easily sit at a desk and grade papers or leave the room. The proposed teacher activity for tasks four and five is coded as "not specified" (NS) because no information is given directly in the text.

Coding Specific Task Analysis Features

The task features to be analyzed are listed at the left side of the chart on page 4. Each feature is explained individually here.

Task

Each task is coded with a unique number to distinguish this task from any other task being analyzed. The system for assigning identification numbers to tasks will be decided upon by the researcher and thus will be different for each study.

Each task is labelled in the researcher's own words under the comments section of the chart. This label should be a brief informative phrase stating what the students are to accomplish through this task.

Format

Choose a format code from the following list with a plus sign for direct evidence and a minus sign for inferred information from the

text.

1. Teacher makes academic presentation to the whole class (lectures or class discussions led by the teacher).

2. Teacher gives procedural directions to the whole class.

3. Teacher demonstrates the use of manipulable science materials.

4. Presentations to the whole class or class discussions are led by students.

5. Audio-visual presentation: The whole class watches a movie or a filmstrip, listens to a record or a tape recording.

6. Students work in small groups; each group has the same task.

7. Students work in small groups; different groups have different tasks.

8. Students work individually; each student works on the same task.

9. Students work individually; different students have different tasks.

10. Transition from one activity to another. Transitions are tasks completely lacking in information content. They are used simply to advance the course of a lesson. A transition implies a period of time when students are doing something solely to prepare for a subsequent task; students picking up materials is an example of a transition task.

11. Dead time (time spent with no purposeful activity going on). Dead time would never be coded from a literal program text, but the category is necessary for future observation in the classroom.

12. Other. Activities not covered by the categories above.

The comments section is used to justify why a particular code was chosen if justification is necessary. The justification for format may be direct evidence from the text or may be a low-level inference made directly from the text.

Student Materials

Choose a materials code from the following list. Materials may be double coded if necessary to show that two types of materials are

specified for one task. For example, students may be asked to use manipulable science materials and workbooks or worksheets for one task. When only one type of material is in use, the code is recorded in Column A and a zero (0) is entered in Column B. Again, use a plus for direct evidence and a minus to indicate inferred information.

1. No materials in use.
2. Manipulable science materials.
3. Textbooks or other books.
4. Workbooks
5. Worksheets prepared by the teacher.
6. Worksheets prepared by someone other than the teacher.
7. Tests.
8. The students' own paper and notebooks.
9. Movies or filmstrips.
10. Records or audio tapes.
11. Art materials.
12. Games or puzzles.
13. Materials not included in the above categories.

Use the Comments section to list the specific materials to be used. Any materials used by the teacher only should be listed in parentheses in this section. (Student materials are the only materials coded, but all materials that are used should be described.)

Proposed Teacher Activity

Choose a coded response from the following list. Teacher Activity may be double coded if necessary. When only one teacher activity is described, the code (with appropriate plus or minus sign) is recorded in Column A and a zero (0) is entered in Column B.

1. Talking to the whole class--academic presentation.
2. Talking to the whole class--procedural directions.
3. Talking to an individual.
4. Talking to a small group.
5. Teacher using science materials.
6. Monitoring.
7. Paperwork.
8. Nothing.
9. Other or out of the room.

Describe the teacher's specific activity under the Comments section. Also present any justification for a specific code if an inference was made directly from the program text. (The left of the dotted line is used for reference to the Program Text and the right side is used to refer to other parts of the teacher's guide or other program materials.)

Proposed Student Activity

Choose a coded response from the following list. Student Activity may be double coded if necessary. When only one student activity is described, the code (with appropriate plus or minus sign) is recorded in Column A and a zero is entered in Column B.

1. Listening.
2. Writing.
3. Working with science materials.
4. Reading.
5. Talking about task-related matters.
6. Doing procedural tasks.

Describe the students' specific activity under the Comments section. Also present any justification for a specific code if an inference

was made directly from the program text. Use the same procedure for left and right sides of the dotted line as described previously.

Information Content

This feature is designed to determine what content information is presented for students to learn. Statements or propositions that are stated or inferred directly from the text should be recorded to the left of the dotted line in the Comments section. For example, in Task 1 of *SCIS Ecosystems*, Chapter 12, the text states: "They should be aware that the tablet is bubbling as it dissolves." This is a statement of the proposition that: A seltzer tablet bubbles as it dissolves. In the second task is stated "...ask them how they might test whether the gas contains carbon dioxide. They will probably suggest BTB." This is fairly direct evidence of the proposition: BTB may be used to test whether seltzer gas contains carbon dioxide. Thus these two propositions would be listed as Information Content on the left side of the dotted line for their respective tasks.

Information content that can be found within the curriculum program, but in places other than the specific text being analyzed, should be listed to the right of the dotted line. In the SCIS program, for example, each chapter is included in a larger instructional unit or section containing several chapters. Each section contains general information presented for the teacher as well as some general procedures. This background information is analyzed separately for its content. Any information relevant to propositions learned in Chapter 12 is listed to the right of the dotted line in the Comments section.

Three spaces are provided in the Code section relevant to each proposition: Source A, Source B, and Code #. The first two

spaces are used to record source codes from the following list:

1. Teacher statement.
2. Science materials used by students.
3. Books.
4. Workbooks.
5. Teacher prepared worksheet.
6. Other worksheet.
7. Chart or poster.
8. Written on chalkboard or overhead projector.
9. Prepared visual materials such as movies, slides, filmstrips, or transparencies.
10. Prepared audio materials such as records or cassettes.
11. Statement by a student.
12. Teacher demonstration.
13. Student response task.
14. Other.

If only one source for the proposition can be identified, the code (with appropriate plus or minus sign) is recorded in Column A and Column B is filled with a zero.

The third space is used to record a unique identification number for each proposition. As with task identification discussed on p. 7, the system for assigning proposition identification numbers will be decided upon by the researcher and will be different for each study.

The horizontal dotted line provides space for listing and coding two propositions. If only one proposition is listed, then the remaining spaces are filled with zeros.

Science Tasks

Many science programs are designed to teach not only information of the type specified under Information Content, but also process skills. Students are to learn how to do certain types of tasks. Some tasks necessary for the completion of a lesson, such as clean-up or tasks designed solely to transfer information, are important primarily as a means to an end. Student skill on other tasks, such as those involving measurement or careful observation, may be an end in itself. The Science Tasks feature allows for the identification of those tasks which are ends in themselves.

This feature is to be coded with necessary justification written in the Comments section. The Science Tasks are coded from the following list. These are the science tasks actually performed *by the students.*

Science tasks may be double coded if two science tasks are found within one lesson task. As with the other coded features, use a plus sign for direct evidence and a minus sign for inferred information. If only one science task is indicated, record the code number in Column A and fill Column B with a zero (0).

10. Design and plan investigations (substantially all in one task).
    - 11. Formulate problem or question to be investigated.
    - 12. Formulate hypothesis to be tested.
    - 13. Design a measurement or observation procedure.
    - 14. Design an experiment.
    - 15. Predict a result.
    - 19. Other.
20. Carry out investigations (substantially all in one task).
    - 21. Observe.

22. Measure.

23. Manipulate apparatus.

24. Record results; describe observation.

29. Other.

30. Analyze and interpret results of investigations.

31. Transform results.

32. Determine relationship.

33. Formulate generalization or model.

34. Explain a relationship.

39. Other.

40. Analyze an investigation (procedure only).

41. Analyze the design of an investigation.

42. Analyze the apparatus and procedures of an investigation.

43. Analyze the interpretation of the investigation.

49. Other.

Function and Linkage

No code is employed in this feature. The Comments section is used for informal descriptions of the following properties of the task.

(1) What is the *purpose* or *function* of this particular task within the total context of the lesson or chapter (i.e., Why is this particular task necessary in this sequence of tasks chosen for analysis?)?

(2) What is the *linkage* of the task to other tasks based on its function in the lesson or chapter being analyzed? For example, the demonstration in Task 1 is directly linked to the experiment referred to in Task 4.

Part of the purpose for the demonstration is to enable the students to set up their own gas generators in Task 4, so Task 1 is linked to Task 4 based on the function of Task 1. Thus, in the analysis of Task 1, the researcher may note that the experiment referred to in Task 4 is the one demonstrated in Task 1 (with the addition of BTB).

Ground Rules for Task Identification

This procedure is used to delineate tasks.

(1) Read the program materials to answer the question: What are the students asked to do now? Continue to ask this question every few lines of text. Whenever your answer to this question changes (i.e., when the *students* are asked to do something else), a new task begins.

(2) If a change occurs in format, student materials, or proposed student activity, then a change in task is indicated.

(3) Students may remain in a whole class discussion format but be asked to accomplish more than one task. Whenever the focus changes to different information content or to different materials, then a change in task is indicated. For example, in Task 1 in *SCIS Ecosystems*, Chapter 12, the children are watching a demonstration. When they are asked to suggest a test for carbon dioxide gas, Task 2 begins. Although the discussion continues, its focus has changed.

(4) Watch for double-coded items. Unless the double coding refers to two activities that will take place simultaneously, the researcher may have reason to divide the text into two tasks. (Double coding can be appropriate for student materials, teacher activity, student activity, and science tasks at times, but care should be exercised.)

(5) Different tasks can occur simultaneously in a classroom of students. These tasks would generally be coded as "students working

APPENDIX A

Examples of Task Analysis

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Demonstration of a gas generator
FORMAT	+3		
STUDENT MATERIALS	A +1	B 0	(Teacher materials: plastic cup, vial/cap, water, plastic tube, seltzer tablet)
PROPOSED TEACHER ACTIVITY	+5	-1	"set up a gas generator" "Ask your students..."
PROPOSED STUDENT ACTIVITY	-1	-5	"Ask your students...," "They should be aware..."
INFORMATION CONTENT	Source: A 12, B 0 0	Code #: 0	A seltzer tablet bubbles as it dissolves.
SCIENCE TASKS	0	0	No procedures specified.
FUNCTION AND LINKAGE			Linked with Task 4 - shows experiment students are to perform.

Program Text

Demonstrating the gas generator. To introduce this activity, set up a gas generator as follows:

1. Fill a plastic cup about half full of water and a vial one-quarter full of water.
2. Insert a plastic tube into the hole in the vial cap to a depth of about ¼ inch.
3. Drop one seltzer tablet into the vial of water and snap the cap on the vial. (The open end of the tube should not touch the water.)

Ask your students what is happening to the tablet. They should be aware that the tablet is bubbling as it dissolves. Now place the other end of the plastic tube into the cup of water.

NOTES: Teacher materials are listed in parentheses. Because no materials are stated in the text for students, use this as a direct indication from the text for code 1 for Student Materials.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Suggest BTB as a test for CO_2.
FORMAT	-1		"...ask them," "They will suggest..."
STUDENT MATERIALS	A: +1	B: 0	
PROPOSED TEACHER ACTIVITY	-1	0	"...ask them" assume whole class discussion.
PROPOSED STUDENT ACTIVITY	-1	-5	"...ask them" "They will probably suggest..."
INFORMATION CONTENT	Source A: 11 Source B: 0 0 0	Code #: 2 0	BTB may be used to test whether seltzer gas contains CO_2.
SCIENCE TASKS	0	0	No procedures specified.
FUNCTION AND LINKAGE			None

Program Text

When the children see gas bubbling through the water in the cup, ask them how they might test whether this gas contains carbon dioxide. They will probably suggest using BTB.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Students pick up materials.
FORMAT	+10		
STUDENT MATERIALS	A +2	B 0	vial, vial cap with hole, plastic tube, plastic cup, BTB, seltzer tablet, water (specified under Teaching Materials)
PROPOSED TEACHER ACTIVITY	NS	0	
PROPOSED STUDENT ACTIVITY	+6	0	
INFORMATION CONTENT	Source A: 0 Source B: 0 Code #: 0		None
	0	0	0
SCIENCE TASKS	0	0	None
FUNCTION AND LINKAGE			None

Program Text

Children's experiments. Have the children pick up the materials they will need.

NOTE: Format is clearly a transition between a class demonstration/discussion and team experiments.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE			COMMENTS
TASK				Students prepare experiments.
FORMAT	+6			"each team..."
STUDENT MATERIALS	A +2		B 0	plastic cup, plastic tube, vial, vial cap w/hole, BTB, water, seltzer tablet (listed under Teaching Materials)
PROPOSED TEACHER ACTIVITY	NS		0	
PROPOSED STUDENT ACTIVITY	+3		0	
INFORMATION CONTENT	Source A 0 0	 B 0 0	Code # 0 0	None
SCIENCE TASKS	22		23	One student adds twelve drops of BTB while the other sets up equipment
FUNCTION AND LINKAGE				Linked to Task 1 and to Task 5

Program Text

And begin the experiment. One member of each team should add twelve drops of BTB to the water in the cup while the other sets up the rest of the equipment.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Observe experiments to see interaction between gas and BTB.
FORMAT	-6		can assume children will observe experiments they set up in Task 4.
STUDENT MATERIALS	A +2	B 0	plastic cup, plastic tube, vial, vial cap/hole, water, seltzer tablet, BTB (listed under Teaching Materials)
PROPOSED TEACHER ACTIVITY	NS	0	
PROPOSED STUDENT ACTIVITY	+3	0	"The children will observe that gas interacts with BTB."
INFORMATION CONTENT	Source: A: 2, B: 0	Code #: 0	BTB interacts with seltzer gas.
SCIENCE TASKS	21	0	Observe investigation
FUNCTION AND LINKAGE			Linked to Task 4-reason that Task 4 took place Also linked to Task 6.

Program Text

In very little time, the children will observe that gas from the tablets interacts with BTB.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Discuss results of the experiment.
FORMAT	-1		"After the children have observed... ask them..."
STUDENT MATERIALS	A: +1	B: 0	None specified
PROPOSED TEACHER ACTIVITY	-1	0	"ask them"
PROPOSED STUDENT ACTIVITY	-1	-5	"ask them..." (assume they will listen and discuss)
INFORMATION CONTENT	Source A: 0 / Source B: 0	Code #: 0	None
	0	0	
SCIENCE TASKS	0	0	None
FUNCTION AND LINKAGE			Linked to Task 5

Program Text

Discussion. After the children have observed the results of their experiment, ask them questions similar to these: What kind of gas do the tablets produce? What evidence did you use to identify the gas?

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TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Compare this experiment with blowing through BTB.
FORMAT	-1		"ask the children"
STUDENT MATERIALS	A: +1	B: 0	None specified.
PROPOSED TEACHER ACTIVITY	-1	0	"ask the children"
PROPOSED STUDENT ACTIVITY	-1	-5	"ask the children" (assume they will listen and discuss)
INFORMATION CONTENT	Source A: 0	Source B: 0	Code #: 0 — None
	0	0	0
SCIENCE TASKS	0	0	None
FUNCTION AND LINKAGE			None

Program Text

Also ask the children to compare the results of blowing through blue BTB with those from this experiment.

Program SCIS Date _____ Analyst _____ Chapter/Part 12

TASK DESCRIPTION FORM

ANALYSIS FEATURE	CODE		COMMENTS
TASK			Clean-up
FORMAT	+10		
STUDENT MATERIALS	A +2	B 0	BTB solutions. "The equipment" - plastic cup and tube, vial, vial cap
PROPOSED TEACHER ACTIVITY	NS	0	
PROPOSED STUDENT ACTIVITY	-6	0	(assume student participation in clean-up)
INFORMATION CONTENT	Source A: 0 Source B: 0	Code #: 0	None
	0	0	
SCIENCE TASKS	0	0	
FUNCTION AND LINKAGE			None

Program Text

Cleanup. The BTB solutions may be discarded. All equipment should be rinsed and allowed to dry. Be certain that all seltzer residue in the gas generators is removed. If any of this material remains, it could affect the results of future experiments with organisms.